

COFC



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(Case No. 205-A.002)

In the Application of: **WOBBEN**

Serial No: **10/089,812**

Filed: **June 27, 2002**

Title: **METHOD FOR OPERATING A WIND FARM**

)
)
)
) **Patent No.: 6,724,097 B1**
)
)
)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**Certificate
JUL 23 2004
of Correction**

Certificate of Mailing under 37 CFR 1.8

I hereby certify that the attached: **(1)** Request for Certificate of Correction under 37 CFR 1.322 (2 pages + Tab 1 (6 pages) + Tab 2 (19 pages)), **(2)** Certificate of Correction (1 page) are being deposited with the United States Postal Service with sufficient postage as first class mail in an envelop addressed to:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

on July 15, 2004.



Signature



Print Name of Person Signing Certificate

JUL 23 2004



UNITED STATES PATENT AND TRADEMARK OFFICE
(Case No. 205-A.002)

In the Application of: **WOBBEN**)
)
Serial No: **10/089,812**)
) **Patent No.: 6,724,097**
Filed: **June 27, 2002**)
)
Title: **METHOD FOR OPERATING A WIND FARM**)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 CFR 1.322

Dear Sir:

It is respectfully requested that the Commissioner issue the attached Certificate of Correction to correct typographical errors in U.S. Patent 6,724,097 (hereinafter "the '097 patent", copy attached as Tab 1). In particular, the attached Certificate of Correction seeks to correct typographical errors in claims 1, 9 and 10 including:

Col. 3, line 43 "rated" was erroneously printed as "rat d".

Col. 4, line 61 "power" was erroneously printed as "pow r".

Col. 5 line 7, "one" was erroneously printed as "ore".

This error incurred through the fault of the U.S. Patent and Trademark Office ("USPTO"), as is clearly disclosed herein by the records in the USPTO.

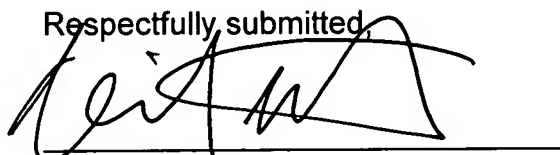
In particular, on line 3 of claim 7 of the Amendment and Remarks dated July 2, 2003, it is clearly shown that the word "rated" is not "rat d" as printed in claim 1 (col. 3, line 43) of the '097 patent. On line 2 of claim 15 of the Preliminary Amendment, it is clearly

shown that the word "power" is not "pow r" as printed in claim 9 (col. 4, line 61) of the '097 patent. On line 4 of claim 16 of the Preliminary Amendment, it is clearly shown that the word "one" is not "ore" as printed in claim 10 of the '097 patent. A copy of the aforementioned Preliminary Amendment, as filed, is attached hereto as Tab 2.

It is respectfully requested that the attached Certificate of Correction issue. It is noted that should a telephone interview expedite consideration of this request in any way, kindly contact the undersigned at the telephone number listed below. Thank you.

Dated: July 15, 2004

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Neil Steinberg', is written over a horizontal line.

Neil Steinberg
Reg. No. 34,735
Attorney of Record
650-968-8079

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**



US006724097B1

(12) **United States Patent**
Wobben

(10) Patent No.: **US 6,724,097 B1**
(45) Date of Patent: **Apr. 20, 2004**

(54) **METHOD FOR OPERATING A WIND FARM**

(76) Inventor: **Aloys Wobben, Argestrasse 19,
D-26607 Aurich (DE)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 146 days.

(21) Appl. No.: **10/089,812**

(22) PCT Filed: **Jul. 8, 2000**

(86) PCT No.: **PCT/EP00/06493**

§ 371 (c)(1),

(2), (4) Date: **Jun. 27, 2002**

(87) PCT Pub. No.: **WO01/25630**

PCT Pub. Date: **Apr. 12, 2001**

(30) **Foreign Application Priority Data**

Oct. 6, 1999 (DE) 199 48 196

(51) Int. Cl.⁷ **F03D 9/00; G05D 11/00**

(52) U.S. Cl. **290/44; 700/286; 700/291**

(58) Field of Search **290/44; 700/286,
700/291**

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,400,659 A • 8/1983 Barron et al. 322/32
4,423,634 A 1/1984 Audenard et al.
4,556,801 A • 12/1985 Gervasio et al. 290/44
5,210,704 A 5/1993 Hussein
5,845,230 A 12/1998 Lamberson
6,320,272 B1 • 11/2001 Lading et al. 290/44
6,512,966 B2 • 1/2003 Lof et al. 700/291

FOREIGN PATENT DOCUMENTS

EP 0072598 A1 • 2/1983
EP 0 465 696 1/1992
GB 1514995 • 7/1978

GB 2007926 A • 5/1979 H02J/4/00
JP 10301603 A • 11/1998 G05B/13/02
WO PCT/DE81/00092 6/1981
WO WO 9007823 A1 • 7/1990 F03D/7/04
WO WO 9745908 A1 • 12/1997 H02J/3/38
WO PCT/DK99/00020 1/1999
WO WO0177525 A1 • 10/2001

OTHER PUBLICATIONS

“Auslegungaspekte von Windenergiekonvertern”, BWK, vol. 36 (1984) No. 12—Dec., pp. 522–525 (In German and In English).

* cited by examiner

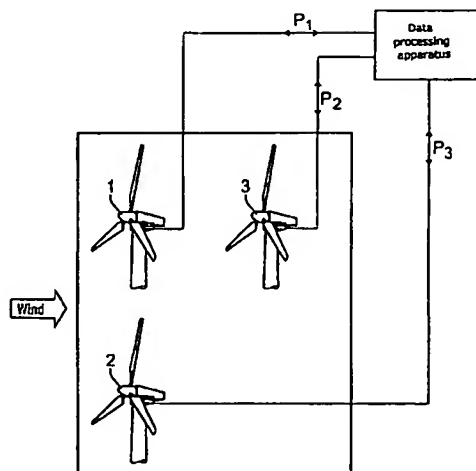
Primary Examiner—Joseph Waks

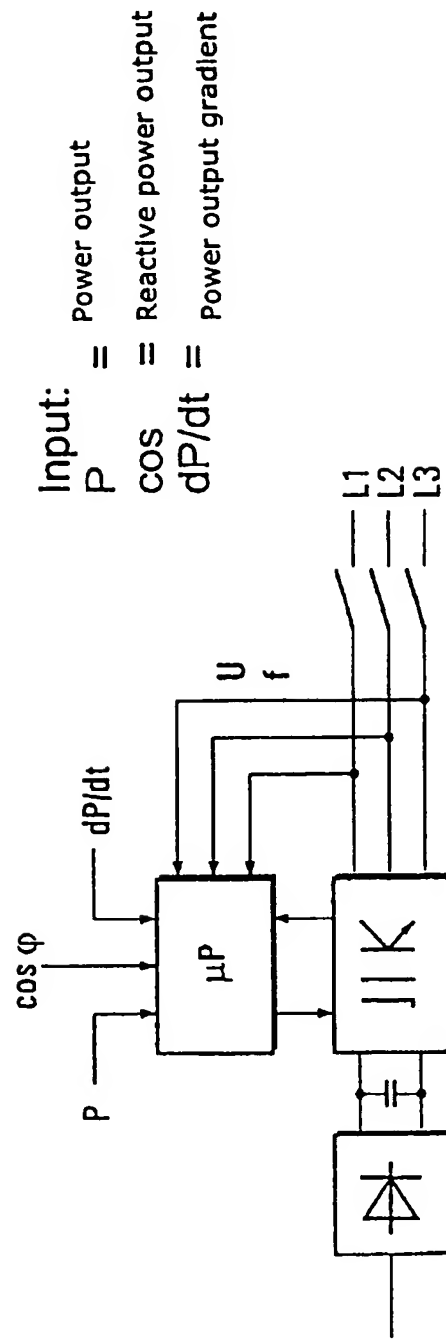
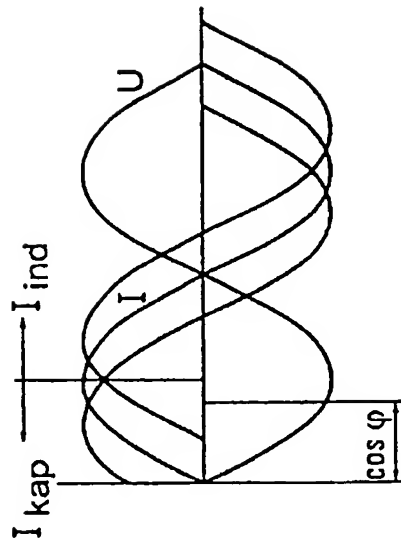
(74) Attorney, Agent, or Firm—Neil A. Steinberg

(57) **ABSTRACT**

A method and apparatus for operating a wind park having maximum permissible output power and a plurality of wind power installations wherein each wind power installation includes an output power and a maximum rated output power. The apparatus, in one aspect, includes a processing unit that is coupled to the plurality of wind power installations to control the output power of at least one of the wind power installations. The processing unit may determine the total output power of all of the plurality of wind power installations and, in response thereto, control the output power of at least one of the plurality of wind power installation so that the total output power of all of the plurality of wind power installations does not exceed the maximum permissible output power of the wind park. The method for operating the wind park, in one aspect, includes determining the output power of the plurality of wind power installations and controlling the output power of at least one of the plurality of wind power installations by reducing the output power of at least one of the plurality of wind power installations if the total output power of all of the plurality of wind power installations exceeds the maximum permissible output power of the wind park.

21 Claims, 2 Drawing Sheets





Input:
 P = Power output
 \cos = Reactive power output
 dP/dt = Power output gradient

50 (60) Hz
 400 V

Fig. 1

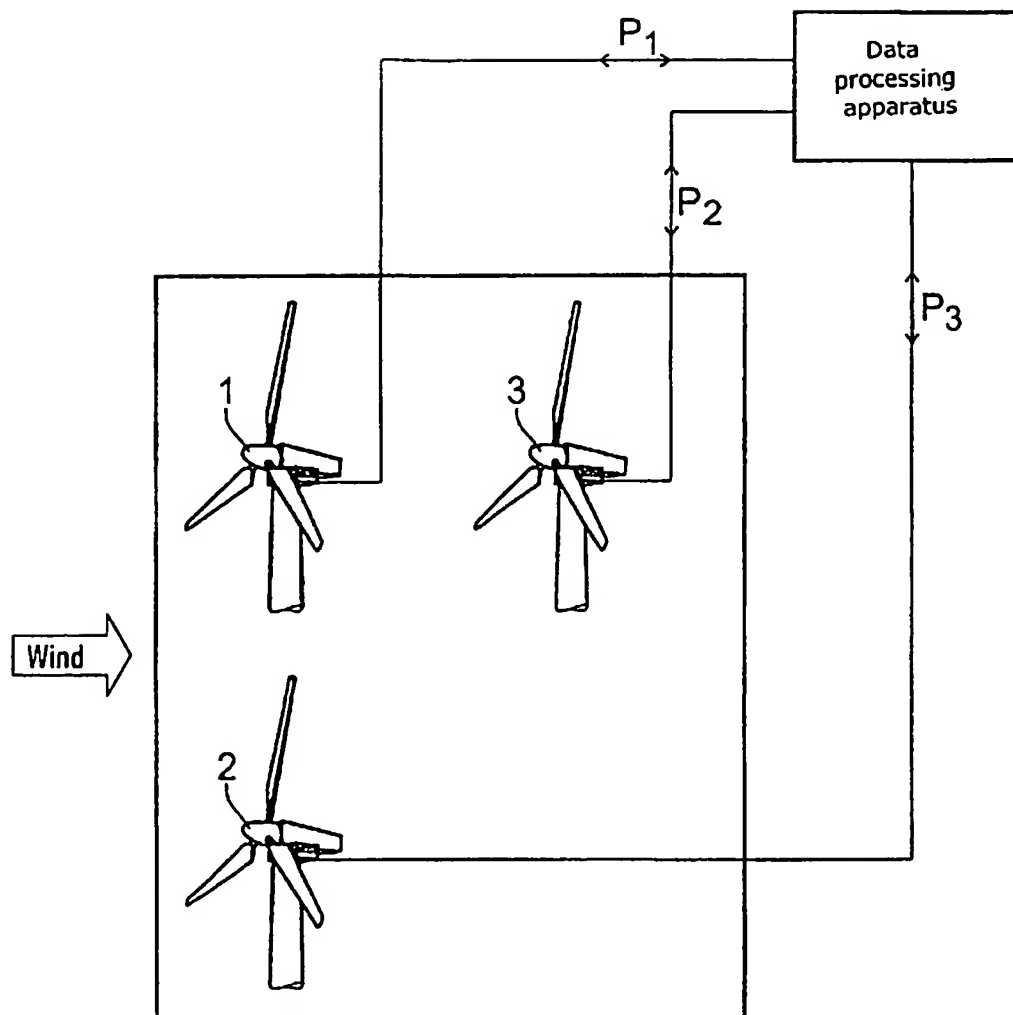


Fig. 2

METHOD FOR OPERATING A WIND FARM

The invention concerns a method of operating a wind park and also a wind park as such.

Wind power installations were initially always set up as singular units and it is only in recent years that wind power installations have frequently been installed in wind parks, this being due also to administrative and building regulations. In that respect a wind park, in its smallest entity, is an arrangement of at least two wind power installations but frequently markedly more. By way of example mention may be made of the wind park at Holtriem (East Frisia in Germany), where more than 50 wind power installations are set up in an array. It is to be expected that the number and also the installed power output of the wind power installations will also rise greatly in future years. In most cases the wind potential is at its greatest in regions of the power supply networks with a low short-circuit capacity and a low level of population density. It is precisely there that the technical connection limits are rapidly attained by the wind power installations, with the consequence that no further wind power installations can then be set up at such locations.

A conventional wind park which is connected for example to a 50 MW substation can therefore have at a maximum only 50 MW total power output, that is to say for example 50 wind power installations each involving a rated power output of 1 MW.

Bearing in mind the fact that the wind power installations are not constantly operated at the rated level and thus the entire wind park also does not continuously reach its maximum power output (rated power output), it can be established that the wind park is not put to optimum use if the rated power output of the wind park corresponds to the maximum possible total power output which is to be fed in.

The invention accordingly proposes a solution in which the wind park is equipped with a total power output which is higher than the maximum possible network feed-in power output. When applied to the above-indicated example, the power output can be raised to a value of over 50 MW, for example 53 MW. As soon as the wind speeds are sufficiently high to produce a limit power output of 50 MW, the wind park regulation in accordance with the invention comes into operation and regulates down individual ones of or all installations when the total maximum power output is exceeded, in such a way that same is always observed. This means that, at wind speed above nominal or rated wind (wind speed at which a wind power installation reaches its rated power output), at least one or all installations is or are operated with a (slightly) throttled power output (for example with a power output of 940 kW instead of 1 MW).

The advantages of the invention are apparent. Considered overall the network components of the feed network (network components are for example the transformer and the lines) are utilized or loaded in the optimum fashion (utilization up to the thermal limit is also a possibility). This means that existing wind park areas can be better utilized, by virtue of setting up a maximum possible number of wind power installations. That number is then no longer (so severely) limited by the existing network capacity.

For the purposes of control/regulation of a wind power installation, it is desirable if it has a data input, by means of/by way of which the electric power output can be adjusted in a range of between 0 and 100% (with respect to the rated power output). If for example a reference value of 350 kW is applied to that data input, the maximum power output of that wind power installation will not exceed the reference value of 350 kW. Any value between 0 and the rated power

output (for example from 0 to 1 MW) is possible as the reference value.

That data input can be used directly for power output limitation purposes.

It is however also possible by means of a regulator to regulate the generator output in dependence on the network voltage (in the wind park network or in the feed network).

A further important function is discussed hereinafter with reference to wind park regulation. It will be assumed by way of example that a wind park comprises 10 wind power installations which each have a rated power output of 600 kW. By virtue of the capacitances of the network components (line capacitances) or the limited capacitances in the substation it will further be assumed that the maximum power output to be delivered (limit power output) is limited to 5200 kW.

There is now the possible option of limiting all wind power installations to a maximum power output of 520 kW by means of the reference value (data input). That satisfies the requirement for limiting the power output to be delivered.

Another possible option involves not exceeding the maximum power output, as the sum of all installation, but at the same time generating a maximum amount of power (kW-hours (work)).

In that respect, it should be known that, at low to moderate wind speeds, within the wind park, it frequently comes about that the wind power installations at the favorable (good) locations (these are the locations at which the wind impinges first within the wind park) receive a great deal of wind. If now all wind power installations are simultaneously regulated down to their throttled value (for example all to 520 kW), that generated power output is admittedly attained by some wind power installations which are disposed at good locations, but some other wind power installations which stand in the "wind shadow" of the well-located wind power installations (being in the second and third rows) receive less wind and as a result operate for example only with a power output of 460 kW and do not reach the value of the maximum throttled power output at 520 kW. The total power output generated in the wind park is accordingly substantially below the permitted limit power output of 5200 kW.

In this case the wind park power output regulation procedure according to the invention regulates the individual installations in such a way that the maximum possible energy yield occurs. This means in specific terms that for example the installations in the first row (that is to say at good locations) are regulated to a higher power output, for example to the rated power output (that is to say no throttling action). This means that the overall electrical power output in the wind park rises. The park regulation arrangement however regulates each individual installation in such a way that the maximum permitted electrical connection power output is not exceeded while at the same time the work produced (kWh) reaches a maximum value.

The wind park management according to the invention can be easily adapted to the respective situations which arise. Thus it is very easily possible for example to implement different throttling of the power output of individual installations if an individual installation or a plurality of installations of a wind park are (have to be) taken off the network, if either for maintenance reasons or for other reasons and an individual installation or a plurality of installations have to be temporarily shut down.

For control/regulation of the wind park or the individual installations, it is possible to use a data/control processing

3

apparatus which is connected to the data inputs of the installations and which, from the wind speeds which are ascertained (in respect of each installation), ascertains the respectively most advantageous power output throttling value for an individual installation or the entire wind park respectively.

FIG. 1 is a block circuit diagram showing control of a wind power installation by means of microprocessor μP which is connected to an inverter arrangement (PWR), by means of which polyphase alternating current can be fed into a power supply network. The microprocessor has a power entry input P, an input for inputting a power factor ($\cos \phi$) and an input for inputting the power gradient (dP/dt).

The inverter arrangement comprising a rectifier, a rectifier intermediate circuit and an inverter is connected to the generator of a wind power installation and receives therefrom the energy produced by the generator, in rotary speed-variable fashion, that is to say in dependence on the speed of rotation of the rotor of the wind power installation.

The design configuration shown in the Figures serves to explain how the power output from a wind power installation can be limited in respect of its magnitude to a maximum possible network feed value.

FIG. 2 is a view illustrating the principle of a wind park comprising for example three wind power installations 1, 2 and 3 of which—as viewed from the direction of the wind—two are disposed in side-by-side relationship and the third is positioned behind the first two. As each of the individual wind power installations has a power input for setting the power output of the respective installation (FIG. 1), the power output levels of an individual wind power installation can be set to a desired value by means of a data processing apparatus, by means of which the entire wind park is controlled.

In FIG. 2 the advantageous locations of the wind power installations are those on which the wind impinges first, that is to say the installations 1 and 2.

What is claimed is:

1. A method of operating a wind park, the wind park having a maximum permissible output power, wherein the wind park includes a plurality of wind power installations, each wind power installation having an output power and a maximum rated output power, the method comprising:

determining the output power of the plurality of wind power installations, and

controlling the output power of at least one of the plurality of wind power installations including,

reducing the output power of at least one of the plurality of wind power installations if the total output power of all of the plurality of wind power installations exceeds the maximum permissible output power of the wind park.

2. The method of claim 1 wherein the plurality of wind power installations are arranged in at least a first row and a second row, and wherein controlling the output power of at least one of the plurality of wind power installation further includes maintaining the output of each wind power installation in the first row at substantially its maximum rated output power and controlling the output power of at least one wind power installation in the second row so that the output power of the wind park is substantially equal to the maximum permissible power output of the wind park.

3. The method of claim 1 wherein the plurality of wind power installations are arranged in at least a first row and a second row, and wherein controlling the output power of at least one of the plurality of wind power installation further includes maintaining the output of each wind power instal-

4

lation in the first row at substantially its maximum rated output power and controlling the output power of at least one wind power installation in the second row so that the output power of the wind park does not exceed the maximum permissible power output of the wind park.

4. The method of claim 1 wherein the plurality of wind power installations are arranged in at least a first row and a second row, and wherein controlling the output power of at least one of the plurality of wind power installation further includes controlling the output power of the wind power installations so that the output power of each wind power installation in the first row is greater than the output power of each wind power installation in the second row and the output power of the wind park does not exceed the maximum permissible power output of the wind park.

5. The method of claim 1, wherein the plurality of wind power installations are arranged in at least a first row, a second row and a third row, and wherein controlling the output power of at least one of the plurality of wind power installation further includes maintaining each wind power installation in the first row at substantially its maximum rated output power and controlling the output power of a plurality of the wind power installations in the second and third rows so that the output power of the wind park does not exceed the maximum permissible power output of the wind park.

6. The method of claim 1 wherein the plurality of wind power installations are arranged in at least a first row, a second row and a third row, and wherein controlling the output power of at least one of the plurality of wind power installation further includes maintaining the output power of each wind power installation in the first row at substantially a maximum rated output power and controlling the output power of a plurality of the wind power installations in the second and third rows so that the output power of the wind park is substantially equal to the maximum permissible power output of the wind park.

7. The method of claim 1 wherein the plurality of wind power installations are arranged in at least a first row, a second row and a third row and wherein controlling the output power of at least one of the plurality of wind power installation further includes controlling the output power of the wind power installations so that the output power of a plurality of wind power installations in the first row is greater than the output power of each wind power installation in the second and third rows and the output power of the wind park does not exceed the maximum permissible power output of the wind park.

8. The method of claim 1 wherein the plurality of wind power installations are arranged in at least a first row and a second row, and wherein controlling the output power of at least one of the plurality of wind power installation further includes controlling the output power of wind power installations so that the output power of all of the wind power installations in the first row are greater than the output power of all of the wind power installations in the second row and the output power of the wind park does not exceed the maximum permissible power output of the wind park.

9. The method of claim 1 further including:

removing at least one wind power installation from the plurality of wind power installations; and

wherein controlling the output power of at least one of the plurality of wind power installations further includes controlling the output power of at least one of the remaining wind power installations of the plurality of the wind power so that the output power of the wind park does not exceed the maximum permissible power

5

output and the output power of the at least one of the remaining wind power installations does not exceed its maximum rated power.

10. The method of claim 1 further including:

removing at least one wind power installation from the plurality of wind power installations; and

wherein controlling the output power of at least one of the plurality of wind power installations further includes controlling the output power of at least one of the remaining wind power installations of the plurality of the wind power so that the output power of the wind park is substantially equal to the maximum permissible power output and the output power of the at least one of the remaining wind power installations does not exceed its maximum rated power.

11. The method of claim 1 wherein controlling the output power of at least one of the plurality of wind power installations further includes increasing the output power of at least one of the plurality of wind power installations, but not exceeding the maximum rated power of the at least one remaining wind power installation, if the total output power of all of the plurality of wind power installations is less than the maximum permissible output power of the wind park.

12. The method of claim 1 wherein controlling the output power of at least one of the plurality of wind power installations further includes controlling the output power of all of the wind power installations so that the output power of the wind park is substantially equal to the maximum permissible power output and the output power of the wind power installations do not exceed the maximum rated power.

13. A wind park for producing output power, wherein the wind park has a maximum permissible output power, the wind park comprising:

a plurality of wind power installations, each wind power installation having an output power and a maximum rated output power;

a processing unit, coupled to the plurality of wind power installations, to control the output power of at least one of the wind power installations, wherein the processing unit determines the total output power of all of the plurality of wind power installations and, in response thereto, controls the output power of at least one of the plurality of wind power installations so that the total output power of all of the plurality of wind power installations does not exceed the maximum permissible output power of the wind park.

14. The wind park of claim 13 wherein the processing unit, in response to the total output power of all of the plurality of wind power installations, increases the output power of at least one of the plurality of wind power installations, but does not exceed the maximum rated power of the at least one of the plurality of wind power installations, if the total output power of all of the plurality of wind power installations is less than the maximum permissible output power of the wind park.

15. The wind park of claim 13 wherein the processing unit, in response to the output power of all of the plurality of wind power installations, reduces the output power of at least one of the plurality of wind power installations if the total output power of all of the plurality of wind power installations exceeds the maximum permissible output power of the wind.

16. The wind park of claim 13 wherein the plurality of wind power installations are arranged in at least a first row and a second row, wherein the processing unit maintains the output power of each wind power installations in the first row at substantially its maximum rated output power and

6

controls the output power of at least one wind power installation in the second row so that the output power of the wind park is substantially equal to the maximum permissible power output of the wind park and wherein the at least one wind power installation does not exceed its maximum rated power.

17. The wind park of claim 13 wherein the plurality of wind power installations are arranged in at least a first row and a second row, wherein the processing unit maintains the output power of each wind power installation in the first row at substantially its maximum rated output power and controls the output power of at least one wind power installation in the second row so that the output power of the wind park does not exceed the maximum permissible power output of the wind park and the at least one wind power installation does not exceed its maximum rated power.

18. The wind park of claim 13 wherein the processing unit, in response to removing at least one wind power installation from the plurality of wind power installations, controls the output power of at least one of the remaining wind power installations of the plurality of the wind power so that the output power of the wind park does not exceed the maximum permissible power output of the wind park and the output power of the at least one of the remaining wind power installation does not exceed its maximum rated power.

19. The wind park of claim 13 wherein the processing unit, in response to removing at least one wind power installation from the plurality of wind power installations, controls the output power of at least one of the remaining wind power installations of the plurality of the wind power so that the output power of the wind park does not exceed the maximum permissible power output and the output power of the at least one of the remaining wind power installation does not exceed its maximum rated power.

20. A method of operating a wind park, the wind park having a maximum permissible output power, wherein the wind park includes a plurality of wind power installations, each wind power installation having an output power and a maximum rated output power, and wherein the plurality of wind power installations are arranged in at least two groups including a first group and a second group, the method comprising:

controlling the output power of the first group of wind power installations so that each wind power installation of the first group provides an output power that is substantially equal to its maximum rated output power; controlling the output power of the second group of wind power installations including reducing the output power of at least one of the plurality of wind power installations in the second group of wind power installations if the total output power of the plurality of wind power installations exceeds the maximum permissible output power of the wind park.

21. The method of claim 20 wherein controlling the output power of the second group of wind power installations further includes increasing the output power of at least one of the plurality of wind power installations in the second group of wind power installations, but does not exceed the maximum rated power of the at least one of the plurality of wind power installations in the second group, if the total output power of all of the plurality of wind power installations is less than the maximum permissible output power of the wind park.

* * * * *

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(205-A.002)

In re Application of: **WOB BEN**

Serial No: **10/089,812**

International Filing Date: **JULY 8, 2000**

Priority Date: **OCTOBER 6, 1999**

Title: **METHOD FOR OPERATING A WIND FARM**

)
)
) Group Art Unit: **3745**
)
) Examiner: **J. WAKS**
)
)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I hereby certify that this correspondence is
being facsimile transmitted to the United States
Patent and Trademark Office,
Fax No. (703) 746-4176 on July 2, 2003
Date

Neil Steinberg
(name of person signing this certificate)


Signature

AMENDMENT AND REMARKS

Dear Sir:

Kindly amend the application as follows:

IN THE DETAILED DESCRIPTION

Please **REPLACE** the paragraph beginning on page 5, line 21 with the following:

The design configuration shown in the Figures serves to explain how
the power output from a wind power installation can be limited in respect of
its magnitude to a maximum possible network feed value.

IN THE ABSTRACT OF THE DISCLOSURE

Please **SUBSTITUTE** the following Abstract of the Disclosure for the currently pending Abstract of the Disclosure.

A method and apparatus for operating a wind park having maximum permissible output power and a plurality of wind power installations wherein each wind power installation includes an output power and a maximum rated output power. The apparatus, in one aspect, includes a processing unit that is coupled to the plurality of wind power installations to control the output power of at least one of the wind power installations. The processing unit may determine the total output power of all of the plurality of wind power installations and, in response thereto, control the output power of at least one of the plurality of wind power installation so that the total output power of all of the plurality of wind power installations does not exceed the maximum permissible output power of the wind park. The method for operating the wind park, in one aspect, includes determining the output power of the plurality of wind power installations and controlling the output power of at least one of the plurality of wind power installations by reducing the output power of at least one of the plurality of wind power installations if the total output power of all of the plurality of wind power installations exceeds the maximum permissible output power of the wind park.

IN THE CLAIMS

Please **SUBSTITUTE** the following claims for the pending claims having the same claim number. A marked-up version of the amended claims, showing insertions and deletions, is included in Appendix A, attached hereto.

1 7. A method of operating a wind park, the wind park having a maximum
2 permissible output power, wherein the wind park includes a plurality of wind power
3 installations, each wind power installation having an output power and a maximum rated
4 output power, the method comprising:
5 determining the output power of the plurality of wind power installations; and
6 controlling the output power of at least one of the plurality of wind power installations
7 including,
8 reducing the output power of at least one of the plurality of wind power
9 installations if the total output power of all of the plurality of wind power installations
10 exceeds the maximum permissible output power of the wind park.

1 8. The method of claim 7 wherein the plurality of wind power installations are
2 arranged in at least a first row and a second row, and wherein controlling the output power
3 of at least one of the plurality of wind power installation further includes maintaining the
4 output of each wind power installation in the first row at substantially its maximum rated
5 output power and controlling the output power of at least one wind power installation in the
6 second row so that the output power of the wind park is substantially equal to the maximum
7 permissible power output of the wind park.

1 9. The method of claim 7 wherein the plurality of wind power installations are
2 arranged in at least a first row and a second row, and wherein controlling the output power
3 of at least one of the plurality of wind power installation further includes maintaining the
4 output of each wind power installation in the first row at substantially its maximum rated
5 output power and controlling the output power of at least one wind power installation in the
6 second row so that the output power of the wind park does not exceed the maximum
7 permissible power output of the wind park.

1 10. **(AMENDED)** The method of claim 7 wherein the plurality of wind power
2 installations are arranged in at least a first row and a second row, and wherein controlling
3 the output power of at least one of the plurality of wind power installation further includes
4 controlling the output power of the wind power installations so that the output power of each
5 wind power installation in the first row is greater than the output power of each wind power
6 installation in the second row and the output power of the wind park does not exceed the
7 maximum permissible power output of the wind park.

1 11. The method of claim 7 wherein the plurality of wind power installations are
2 arranged in at least a first row, a second row and a third row, and wherein controlling the
3 output power of at least one of the plurality of wind power installation further includes
4 maintaining each wind power installation in the first row at substantially its maximum rated
5 output power and controlling the output power of a plurality of the wind power installations
6 in the second and third rows so that the output power of the wind park does not exceed the
7 maximum permissible power output of the wind park.

1 12. The method of claim 7 wherein the plurality of wind power installations are
2 arranged in at least a first row, a second row and a third row, and wherein controlling the
3 output power of at least one of the plurality of wind power installation further includes
4 maintaining the output power of each wind power installation in the first row at substantially
5 a maximum rated output power and controlling the output power of a plurality of the wind
6 power installations in the second and third rows so that the output power of the wind park is
7 substantially equal to the maximum permissible power output of the wind park.

1 13. **(AMENDED)** The method of claim 7 wherein the plurality of wind power
2 installations are arranged in at least a first row, a second row and a third row and wherein
3 controlling the output power of at least one of the plurality of wind power installation further
4 includes controlling the output power of the wind power installations so that the output
5 power of a plurality of wind power installations in the first row is greater than the output
6 power of each wind power installation in the second and third rows and the output power of
7 the wind park does not exceed the maximum permissible power output of the wind park.

1 14. **(AMENDED)** The method of claim 7 wherein the plurality of wind power
2 installations are arranged in at least a first row and a second row, and wherein controlling
3 the output power of at least one of the plurality of wind power installation further includes
4 controlling the output power of wind power installations so that the output power of all of the
5 wind power installations in the first row are greater than the output power of all of the wind
6 power installations in the second row and the output power of the wind park does not
7 exceed the maximum permissible power output of the wind park.

1 15. **(AMENDED)** The method of claim 7 further including:

2 removing at least one wind power installation from the plurality of wind power
3 installations; and

4 wherein controlling the output power of at least one of the plurality of wind power
5 installations further includes controlling the output power of at least one of the remaining
6 wind power installations of the plurality of the wind power so that the output power of the
7 wind park does not exceed the maximum permissible power output and the output power of
8 the at least one of the remaining wind power installations does not exceed its maximum
9 rated power.

1 16. **(AMENDED)** The method of claim 7 further including:

2 removing at least one wind power installation from the plurality of wind power
3 installations; and

4 wherein controlling the output power of at least one of the plurality of wind power
5 installations further includes controlling the output power of at least one of the remaining
6 wind power installations of the plurality of the wind power so that the output power of the
7 wind park is substantially equal to the maximum permissible power output and the output
8 power of the at least one of the remaining wind power installations does not exceed its
9 maximum rated power.

1 17. **(AMENDED)** The method of claim 7 wherein controlling the output power of at

2 least one of the plurality of wind power installations further includes increasing the output
3 power of at least one of the plurality of wind power installations, but not exceeding the

4 maximum rated power of the at least one remaining wind power installation, if the total
5 output power of all of the plurality of wind power installations is less than the maximum
6 permissible output power of the wind park.

1 18. **(AMENDED)** The method of claim 7 wherein controlling the output power of at
2 least one of the plurality of wind power installations further includes controlling the output
3 power of all of the wind power installations so that the output power of the wind park is
4 substantially equal to the maximum permissible power output and the output power of the
5 wind power installations do not exceed the maximum rated power.

1 19. **(AMENDED)** A wind park for producing output power, wherein the wind park
2 has a maximum permissible output power, the wind park comprising:
3 a plurality of wind power installations, each wind power installation having an output
4 power and a maximum rated output power;
5 a processing unit, coupled to the plurality of wind power installations, to control the
6 output power of at least one of the wind power installations, wherein the processing unit
7 determines the total output power of all of the plurality of wind power installations and, in
8 response thereto, controls the output power of at least one of the plurality of wind power
9 installations so that the total output power of all of the plurality of wind power installations
10 does not exceed the maximum permissible output power of the wind park.

1 20. **(AMENDED)** The wind park of claim 19 wherein the processing unit, in
2 response to the total output power of all of the plurality of wind power installations,

increases the output power of at least one of the plurality of wind power installations, but does not exceed the maximum rated power of the at least one of the plurality of wind power installations, if the total output power of all of the plurality of wind power installations is less than the maximum permissible output power of the wind park.

21. The wind park of claim 19 wherein the processing unit, in response to the output power of all of the plurality of wind power installations, reduces the output power of at least one of the plurality of wind power installations if the total output power of all of the plurality of wind power installations exceeds the maximum permissible output power of the wind

22. **(AMENDED)** The wind park of claim 19 wherein the plurality of wind power installations are arranged in at least a first row and a second row, wherein the processing unit maintains the output power of each wind power installations in the first row at substantially its maximum rated output power and controls the output power of at least one wind power installation in the second row so that the output power of the wind park is substantially equal to the maximum permissible power output of the wind park and wherein the at least one wind power installation does not exceed its maximum rated power.

23. **(AMENDED)** The wind park of claim 19 wherein the plurality of wind power installations are arranged in at least a first row and a second row, wherein the processing unit maintains the output power of each wind power installation in the first row at substantially its maximum rated output power and controls the output power of at least one

5 wind power installation in the second row so that the output power of the wind park does
6 not exceed the maximum permissible power output of the wind park and the at least one
7 wind power installation does not exceed its maximum rated power.

1 24. **(AMENDED)** The wind park of claim 19 wherein the processing unit, in
2 response to removing at least one wind power installation from the plurality of wind power
3 installations, controls the output power of at least one of the remaining wind power
4 installations of the plurality of the wind power so that the output power of the wind park
5 does not exceed the maximum permissible power output of the wind park and the output
6 power of the at least one of the remaining wind power installation does not exceed its
7 maximum rated power.

1 25. **(AMENDED)** The wind park of claim 19 wherein the processing unit, in
2 response to removing at least one wind power installation from the plurality of wind power
3 installations, controls the output power of at least one of the remaining wind power
4 installations of the plurality of the wind power so that the output power of the wind park
5 does is substantially equal to the maximum permissible power output and the output power
6 of the at least one of the remaining wind power installation does not exceed its maximum
7 rated power.

1 26. A method of operating a wind park, the wind park having a maximum
2 permissible output power, wherein the wind park includes a plurality of wind power
3 installations, each wind power installation having an output power and a maximum rated

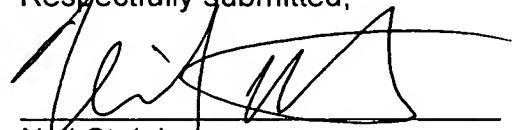
4 output power, and wherein the plurality of wind power installations are arranged in at least
5 two groups including a first group and a second group, the method comprising:
6 controlling the output power of the first group of wind power installations so that each
7 wind power installation of the first group provides an output power that is substantially
8 equal to its maximum rated output power;
9 controlling the output power of the second group of wind power installations
10 including reducing the output power of at least one of the plurality of wind power
11 installations in the second group of wind power installations if the total output power of the
12 plurality of wind power installations exceeds the maximum permissible output power of the
13 wind park.

1 27. **(AMENDED)** The method of claim 26 wherein controlling the output power of
2 the second group of wind power installations further includes increasing the output power of
3 at least one of the plurality of wind power installations in the second group of wind power
4 installations, but does not exceed the maximum rated power of the at least one of the
5 plurality of wind power installations in the second group, if the total output power of all of
6 the plurality of wind power installations is less than the maximum permissible output power
7 of the wind park.

It is noted that should a telephone interview expedite the prosecution of this application in any way, the Examiner is invited to contact the undersigned at the telephone number listed below.

Date: July 2, 2003

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Neil Steinberg', written over a horizontal line.

Neil Steinberg
Reg. No. 34,735
650-968-8079

REMARKS

This Amendment seeks to place this application in condition for allowance. A new Abstract of the Disclosure has been provided and certain of the pending claims have been amended to address the Examiner's concerns (to the extent understood) regarding definiteness (35 USC § 112) as expressed in a telephone interview of July 1, 2003.

In particular, the Abstract of the Disclosure was suggested to be too long and too detailed. As such, a new Abstract of the Disclosure is submitted herewith. It is believed that the new Abstract of the Disclosure addresses the Examiner's concerns and complies with the applicable rules.

Certain claims have been amended, at the request of the Examiner, in order to improve their clarity. It is believed that the claims, as amended, address the Examiner's concern as well as particularly point out and distinctly claim certain features of the Applicant's invention. The amended claims are fully supported by the specification as originally filed. No new matter has been added.

Notably, none of the amendments were not made to address or overcome a rejection or concern regarding patentability in view of prior art. Indeed, no concerns regarding prior art have been raised by the Examiner.

CONCLUSION

Applicant respectfully requests entry of the foregoing Amendment. Applicant submits that all of the claims present patentable subject matter which definitely set forth the novel and unobvious features of Applicant's invention(s). Accordingly, Applicant requests allowance of all of the claims.

Appendix A

Version with Markings to Show Changes Made to the Specification
****(strike-thru indicates a deletion) & (underlying indicates an insertion)****

In the Specification:

1. The paragraph beginning on page 5, line 21 was amended as follows:

The design configuration shown in the Figures ~~Figure~~ serves to explain how the power output from a wind power installation can be limited in respect of its magnitude to a maximum possible network feed value.

2. The ABSTRACT OF THE DISCLOSURE was amended as follows:

A method and apparatus for operating a wind park having maximum permissible output power and a plurality of wind power installations wherein each wind power installation includes an output power and a maximum rated output power. The apparatus, in one aspect, includes a processing unit that is coupled to the plurality of wind power installations to control the output power of at least one of the wind power installations. The processing unit may determine the total output power of all of the plurality of wind power installations and, in response thereto, control the output power of at least one of the plurality of wind power installation so that the total output power of all of the plurality of wind power installations does not exceed the maximum permissible output power of the wind park. The method for operating the wind park, in one aspect, includes determining the output power of the plurality of wind power installations and controlling the output power of at least one of the plurality of wind power installations by reducing the output power of at least one of the plurality of wind power installations if the total output power of all of the plurality of wind power installations exceeds the maximum permissible output power of the wind park.

~~The invention concerns a method of operating a wind park and also a wind park as such.~~

~~Wind power installations were initially always set up as singular units and it is only in recent years that wind power installations have frequently been installed in wind parks, this being due also to administrative and building regulations. In that respect a wind park, in its smallest entity, is an arrangement of at least two wind power installations but frequently markedly more. By way of example mention may be made of the wind park at Holtriem (East Frisia in Germany), where more than 50 wind power installations are set up in an array. It is to be expected that the number and also the installed power output of the wind power installations will also rise greatly in future years. In most cases the wind potential is at its greatest in regions of the power supply networks with a low short circuit capacity and a low level of population density. It is precisely there that the technical connection limits are rapidly attained by the wind power installations, with the consequence that no further wind power installations can then be set up at such locations.~~

~~A method of operating a wind park comprising at least two wind power installations, wherein the power output from the wind power installations is limited in respect of its magnitude to a maximum possible network feed value which is lower than the maximum possible value of the power to be outputted (rated power output) and the maximum possible feed value is determined by the receiving capacitance (line capacitance) of the network into which the energy is fed and/or by the power capacitance of the energy transmission unit or the transformer, by means of which the energy produced by the wind power installation is fed into the network.~~

~~(Figure 1)~~

In the Claims:

1 10. (AMENDED) The method of claim 7 wherein the plurality of wind power
2 installations are arranged in at least a first row and a second row, and wherein controlling
3 the output power of at least one of the plurality of wind power installation further includes
4 controlling the output power of the wind power installations so that the output power of each
5 wind power installation in the first row is greater than the output power of each wind power
6 installation in the second row and the output power of the wind park does not exceed the
7 maximum permissible power output of the wind park.

1 13. (AMENDED) The method of claim 7 wherein the plurality of wind power
2 installations are arranged in at least a first row, a second row and a third row and wherein
3 controlling the output power of at least one of the plurality of wind power installation further
4 includes controlling the output power of the wind power installations so that the output
5 power of a plurality of wind power installations in the first row is greater than the output
6 power of each wind power installation in the second and third rows and the output power of
7 the wind park does not exceed the maximum permissible power output of the wind park.

1 14. (AMENDED) The method of claim 7 wherein the plurality of wind power
2 installations are arranged in at least a first row and a second row, and wherein controlling
3 the output power of at least one of the plurality of wind power installation further includes
4 controlling the output power of wind power installations so that the output power of all of the
5 wind power installations in the first row are greater than the output power of all of the wind

6 power installations in the second row and the output power of the wind park does not
7 exceed the maximum permissible power output of the wind park.

1 15. (AMENDED) The method of claim 7 further including:
2 removing at least one wind power installation from the plurality of wind power
3 installations; and
4 wherein controlling the output power of at least one of the plurality of wind power
5 installations ~~installation~~ further includes controlling the output power of at least one of the
6 remaining wind power installations of the plurality of the wind power so that the output
7 power of the wind park does not exceed the maximum permissible power output and the
8 output power of the at least one of the remaining wind power installations does not exceed
9 its maximum rated power.

1 16. (AMENDED) The method of claim 7 further including:
2 removing at least one wind power installation from the plurality of wind power
3 installations; and
4 wherein controlling the output power of at least one of the plurality of wind power
5 installations ~~installation~~ further includes controlling the output power of at least one of the
6 remaining wind power installations of the plurality of the wind power so that the output
7 power of the wind park is substantially equal to the maximum permissible power output and
8 the output power of the at least one of the remaining wind power installations does not
9 exceed its maximum rated power.

1 17. **(AMENDED)** The method of claim 7 wherein controlling the output power of at
2 least one of the plurality of wind power installations ~~installation~~ further includes increasing
3 the output power of at least one of the plurality of wind power installations, but not
4 exceeding the maximum rated power of the at least one remaining wind power installation,
5 if the total output power of all of the plurality of wind power installations is less than the
6 maximum permissible output power of the wind park.

1 18. **(AMENDED)** The method of claim 7 wherein controlling the output power of at
2 least one of the plurality of wind power installations ~~installation~~ further ~~includes controlling~~
3 includes controlling the output power of all of the wind power installations so that the output
4 power of the wind park is substantially equal to the maximum permissible power output and
5 the output power of the wind power installations do not exceed the maximum rated power.

1 19. **(AMENDED)** A wind park for producing output power, wherein the wind park
2 has a maximum permissible output power, the wind park comprising:
3 a plurality of wind power installations, each wind power installation having an output
4 power and a maximum rated output power;
5 a processing unit, coupled to the plurality of wind power installations, to control the
6 output power of at least one of the wind power installations, wherein the processing unit
7 determines the total output power of all of the plurality of wind power installations and, in
8 response thereto, controls the output power of at least one of the plurality of wind power
9 installations ~~installation~~ so that the total output power of all of the plurality of wind power
10 installations does not exceed the maximum permissible output power of the wind park.

1 20. **(AMENDED)** The wind park of claim 19 wherein the processing unit, in
2 response to the total output power of all of the plurality of wind power installations,
3 increases the output power of at least one of the plurality of wind power installations, but
4 does not exceed the maximum rated power of the at least one of the plurality of wind power
5 installations, if the total output power of all of the plurality of wind power installations is less
6 than the maximum permissible output power of the wind park.

1 22. **(AMENDED)** The wind park of claim 19 wherein the plurality of wind power
2 installations are arranged in at least a first row and a second row, wherein the processing
3 unit maintains the output power of each wind power installations in the first row at
4 substantially its maximum rated output power and controls the output power of at least one
5 wind power installation in the second row so that the output power of the wind park is
6 substantially equal to the maximum permissible power output of the wind park and wherein
7 the at least one wind power installation does not exceed its maximum rated power.

1 23. **(AMENDED)** The wind park of claim 19 wherein the plurality of wind power
2 installations are arranged in at least a first row and a second row, wherein the processing
3 unit maintains the output power of each wind power installation in the first row at
4 substantially its maximum rated output power and controls the output power of at least one
5 wind power installation in the second row so that the output power of the wind park does
6 not exceed the maximum permissible power output of the wind park and the at least one
7 wind power installation does not exceed its maximum rated power.

1 24. **(AMENDED)** The wind park of claim 19 wherein the processing unit, in
2 response to removing at least one wind power installation from the plurality of wind power
3 installations, controls the output power of at least one of the remaining wind power
4 installations of the plurality of the wind power so that the output power of the wind park
5 does not exceed the maximum permissible power output of the wind park and the output
6 power of the at least one of the remaining wind power installation does not exceed its
7 maximum rated power.

1 25. **(AMENDED)** The wind park of claim 19 wherein the processing unit, in
2 response to removing at least one wind power installation from the plurality of wind power
3 installations, controls the output power of at least one of the remaining wind power
4 installations of the plurality of the wind power so that the output power of the wind park
5 does is substantially equal to the maximum permissible power output and the output power
6 of the at least one of the remaining wind power installation does not exceed its maximum
7 rated power.

1 27. **(AMENDED)** The method of claim 26 wherein controlling the output power of
2 the second group of wind power installations further includes increasing the output power of
3 at least one of the plurality of wind power installations in the second group of wind power
4 installations, but does not exceed the maximum rated power of the at least one of the
5 plurality of wind power installations in the second group, if the total output power of all of
6 the plurality of wind power installations is less than the maximum permissible output power
7 of the wind park.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO : 6,724,097 B1
DATED : April 20, 2004
INVENTOR(S) : Wobben

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In col. 3, on line 43, delete "rat d" and substitute --rated--.

In col. 4, on line 61, delete "pow r" and substitute --power--.

In col. 5, on line 7, delete "ore" and substitute --one--.

MAILING ADDRESS OF SENDER: Neil A. Steinberg
Steinberg & Whitt
2665 Marine Way, Suite 1150
Mountain View, CA 94043

PATENT NO. 6,724,097 B1

No. of additional copies



Burden Hour Statement: This form is estimated to take 1.0 hour to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

JUL 23 2004